

FIG. 1A

POLARIZATION  
DIRECTION

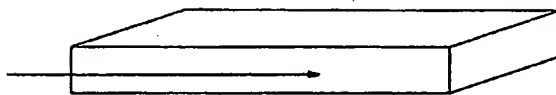


FIG. 1B

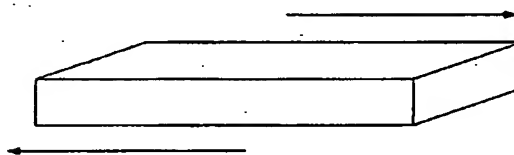


FIG. 2

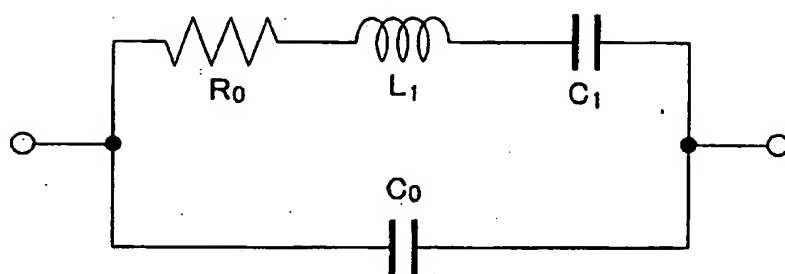


FIG. 3

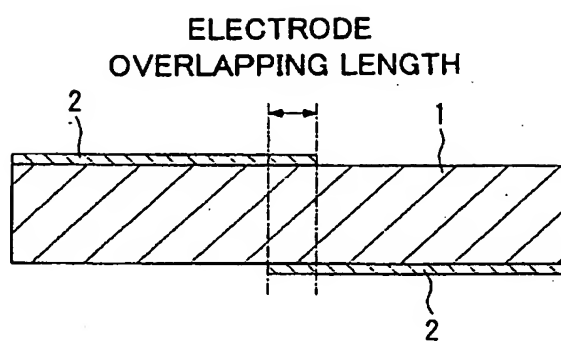
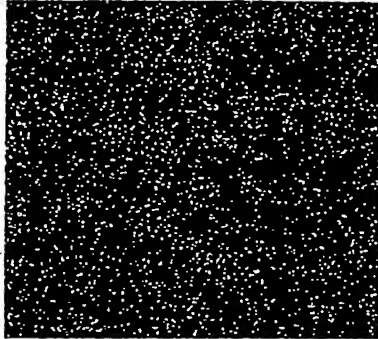


FIG. 4

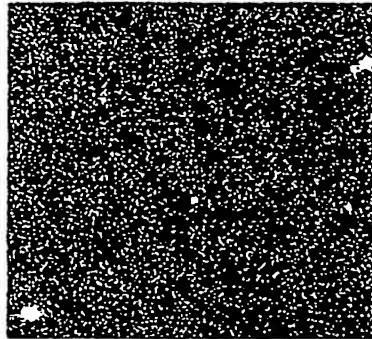
SPECIMEN No.	ADDITIVE		MAIN COMPONENT $Pb_{\alpha}[(Mn_{1/3}Nb_{2/3})_xTi_yZr_z]O_3$ ( $x+y+z=1$ )				ELECTRIC PROPERTIES $Q_{max}$	MECHANICAL STRENGTH $\sigma_{b3}$ ( $N/mm^2$ )	HEAT RESISTING PROPERTIES $ \Delta F_0 $ (%)	AL- CONTAINING PHASE
	$Al_2O_3$ (wt%)	$SiO_2$ (wt%)	$\alpha$ (mol)	x (mol)	y (mol)	z (mol)				
1	0.1						120	155	0.11	x
2	0.3						135	172	0.07	O
3	0.5	0.02	0.99	0.10	0.53	0.37	136	179	0.08	O
4	0.7						130	192	0.07	O
5	1.0						133	192	0.07	O

FIG. 5

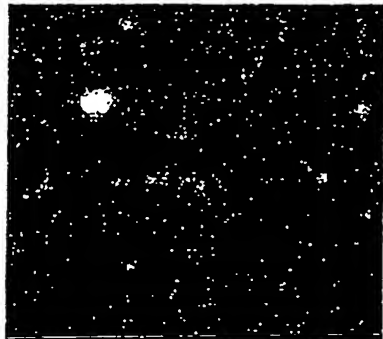
SPECIMEN No. 1



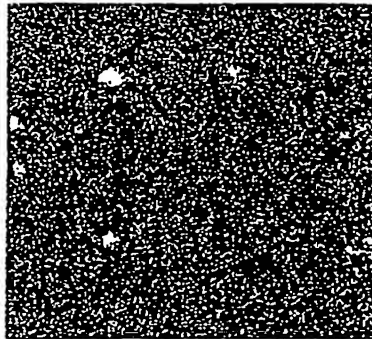
SPECIMEN No. 2



SPECIMEN No. 3



SPECIMEN No. 4



SPECIMEN No. 5

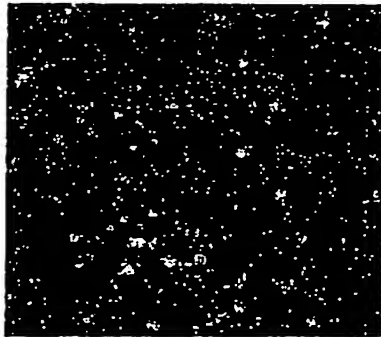


FIG. 6

SPECIMEN No.	ADDITIVE (β)		MAIN COMPONENT Pb <sub>a</sub> [(Mn <sub>1/3</sub> Nb <sub>2/3</sub> ) <sub>x</sub> Ti <sub>y</sub> Zr <sub>2</sub> ]O <sub>3</sub> (x+y+z=1)					ELECTRIC PROPERTIES Q <sub>max</sub>	HEAT RESISTING PROPERTIES   Δk <sub>15</sub>   (%)	TEMPERATURE CHARACTERISTICS	
	Al <sub>2</sub> O <sub>3</sub> (wt%)	SiO <sub>2</sub> (wt%)	α (mol)	x (mol)	y (mol)	z (mol)	ΔF <sub>0</sub> (-40°C)			ΔF <sub>0</sub> (85°C)	
6	0.01	0.02	0.998	0.10	0.51	0.39	135	3.9	0.18	0.08	
7	0.02						125	3.0	0.16	0.05	
8	0.10						128	2.9	0.21	0.10	
9	0.50						145	1.9	0.27	0.14	
10	1.00						110	3.0	0.33	0.19	
11	0.10		0.990		0.53	0.37	121	2.3	0.09	0.05	
12	0.30						135	2.3	0.04	0.03	
13	0.50						136	2.4	0.04	0.07	
14	0.70						121	2.3	0.03	0.10	
15	1.00						133	2.2	0.04	0.07	
16	1.50						122	2.2	0.02	0.06	
17	2.00						121	2.1	0.02	0.10	
18	3.00						104	2.4	0.00	0.09	
19	10.00						73	2.8	0.01	0.13	

FIG. 7

SPECI- MEN No.	ADDITIVE		MAIN COMPONENT $Pb_{\alpha}[(Mn_{1/3}Nb_{2/3})_xTi_yZr_z]O_3$ ( $x+y+z=1$ )				ELECTRIC PROPER- TIES $Q_{max}$	HEAT RESISTING PROPERTIES $ \Delta k_{15} $ (%)	TEMPERATURE CHARACTERISTICS	
	$Al_2O_3$ (wt%)	$SiO_2$ (wt%)	$\alpha$ (mol)	x (mol)	y (mol)	z (mol)			$ \Delta F_0(-40^\circ C) $	$ \Delta F_0(85^\circ C) $
20 *	0.5	0.02	0.990	0.02	0.56	0.42	29	1.1	0.24	0.14
21				0.04	0.58	0.38	81	0.9	0.11	0.14
22					0.56	0.40	85	1.0	0.25	0.02
23					0.55	0.41	117	1.4	0.29	0.09
24 *					0.54	0.42	108	1.4	0.54	0.19
25				0.06	0.56	0.38	95	1.1	0.09	0.04
26 *					0.52	0.42	177	1.5	1.10	0.77
27 *				0.08	0.59	0.33	98	1.5	0.28	0.41
28					0.54	0.38	112	1.7	0.11	0.02
29				0.09	0.55	0.36	114	1.8	0.03	0.19
30					0.54	0.37	119	1.8	0.05	0.11
31					0.53	0.38	124	1.5	0.13	0.03
32					0.52	0.39	154	1.8	0.24	0.07
33				0.10	0.58	0.32	81	1.7	0.23	0.30
34					0.54	0.36	147	2.1	0.02	0.14
35					0.53	0.37	146	1.8	0.05	0.06
36					0.52	0.38	158	1.7	0.14	0.02
37					0.51	0.39	183	1.6	0.25	0.13
38				0.11	0.53	0.36	135	2.7	0.00	0.09
39					0.52	0.37	127	1.9	0.07	0.00
40					0.51	0.38	163	2.0	0.16	0.10
41					0.50	0.39	170	2.0	0.27	0.22
42				0.12	0.58	0.30	80	2.2	0.29	0.40
43					0.56	0.32	98	2.3	0.20	0.28
44					0.50	0.38	177	2.6	0.13	0.15
45			0.995	0.09	0.55	0.36	128	1.3	0.00	0.17
46					0.54	0.37	131	1.6	0.08	0.08
47					0.53	0.38	129	1.2	0.14	0.02
48					0.52	0.39	154	0.8	0.26	0.10

FIG. 8

SPECI- MEN No.	ADDITIVE						MAIN COMPONENT $Pb_{\alpha}[(Mn_{1-\frac{1}{3}}Nb_{\frac{2}{3}})_xTi_yZr_z]O_3$ ( $x+y+z=1$ )					ELECTRIC PROPER- TIES $Q_{max}$	HEAT RESISTING PROPERTIES $ \Delta k_{15} $ (%)	TEMPERATURE CHARACTERISTICS	
	$Al_2O_3$ (wt%)	$Ga_2O_3$ (wt%)	$Ta_2O_5$ (wt%)	$Sc_2O_3$ (wt%)	$In_2O_3$ (wt%)	$SiO_2$ (wt%)	$\alpha$ (mol)	x (mol)	y (mol)	z (mol)	$ \Delta F_0(-40^{\circ}C) $			$ \Delta F_0(85^{\circ}C) $	
49	-	0.02	-	-	-	-	1.000	0.10	0.51	0.39	141	2.2	0.40	0.25	
50	-	0.10	-	-	-	-	1.000	0.10	0.51	0.39	145	2.0	0.35	0.23	
51	-	-	0.50	-	-	-	1.000	0.10	0.51	0.39	166	2.7	0.12	0.07	
52	-	-	0.50	-	-	-	0.995	0.09	0.55	0.36	107	2.8	0.15	0.30	
53	-	-	0.50	-	-	-	0.995	0.09	0.53	0.38	119	1.9	0.03	0.17	
54	-	-	0.50	-	-	-	0.995	0.09	0.52	0.39	140	1.6	0.05	0.09	
55	-	-	-	0.02	-	-	0.990	0.10	0.51	0.39	147	2.9	0.25	0.12	
56	-	-	-	0.10	-	-	0.990	0.10	0.51	0.39	138	2.7	0.30	0.17	
57	0.45	-	-	-	0.02	-	0.990	0.10	0.51	0.39	131	2.2	0.25	0.15	
58*	-	-	-	-	-	0.20	1.000	0.10	0.51	0.39	81	4.5	0.15	0.13	
59*	-	-	-	-	-	0.30	1.000	0.10	0.51	0.39	129	4.7	0.09	0.04	
60*	-	-	-	-	-	0.50	1.000	0.10	0.51	0.39	120	4.2	0.16	0.13	